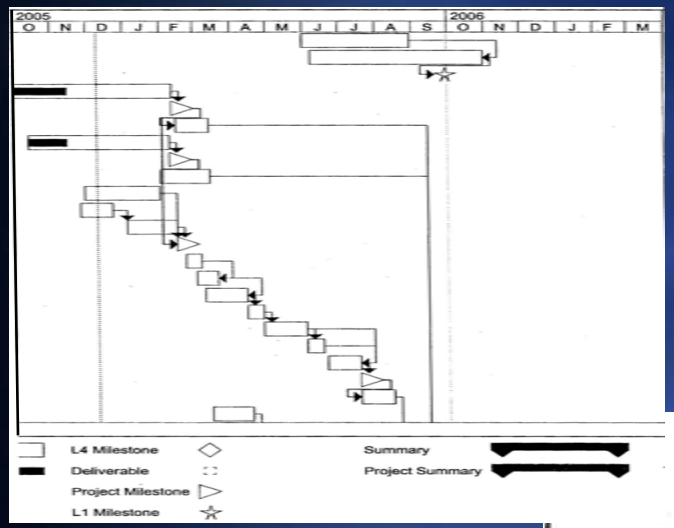
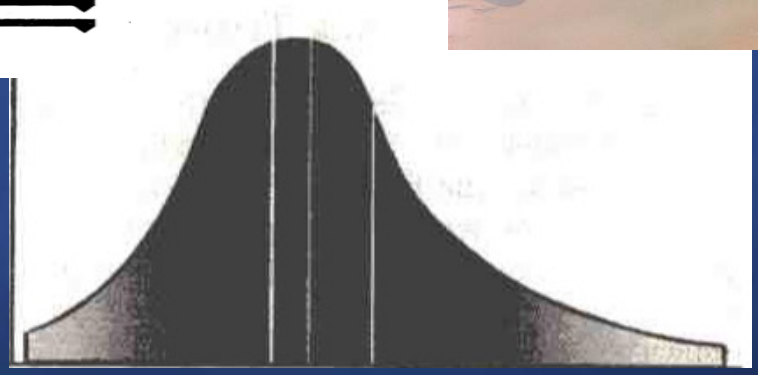
How Risk Management Can Make You Healthy, Wealthy, and a Wiser Project Manager





PM Challenge

February 2009

Daytona Beach, FL

Dr. James F. Stewart
NASA Engineering and Safety Center Chief Engineer
at
NASA Dryden Flight Research Center

Background

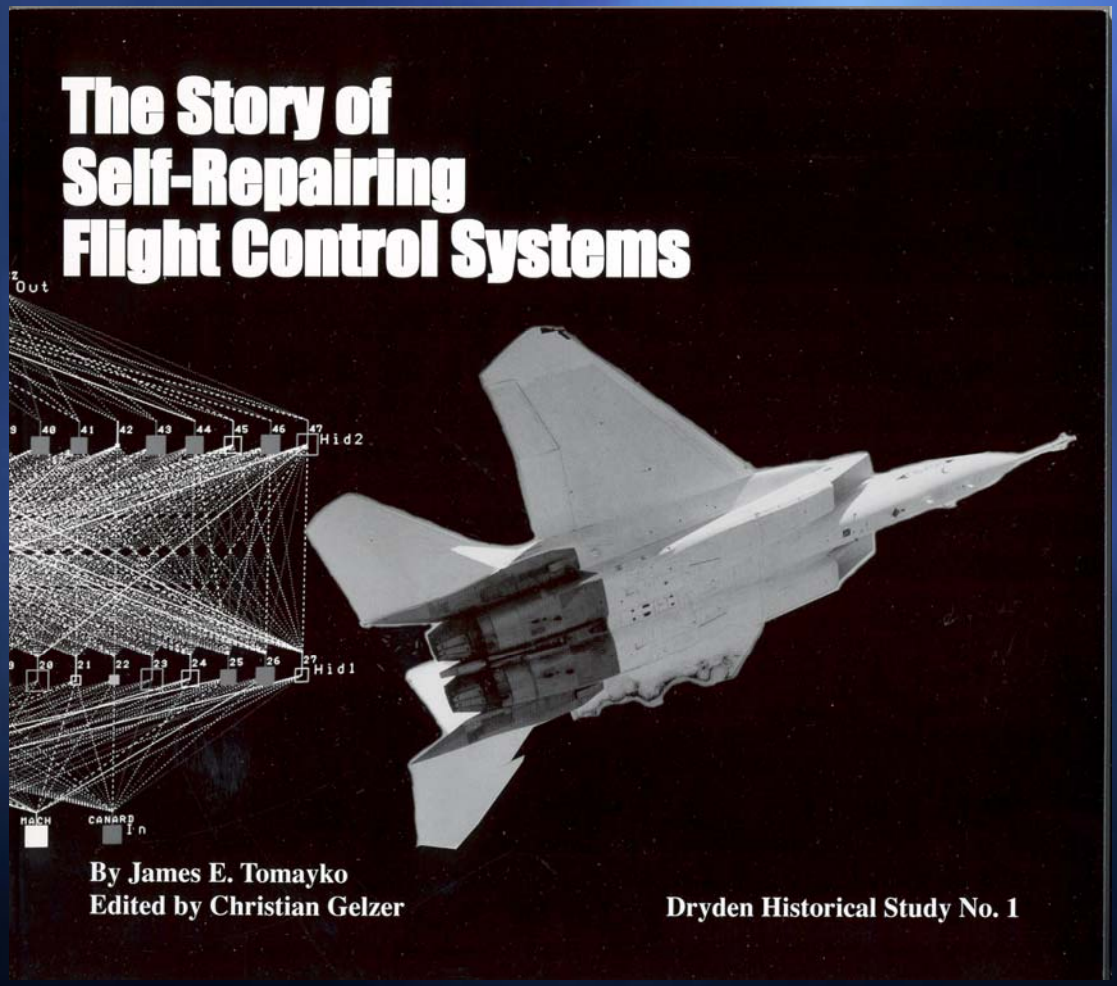
- Worked in the Aerospace Industry forty-four years over half the time in Project/Program Management and Managing Project Managers
- Presented first paper on Project Management in Nov. 1983 (1)
- Expanded it to a NASA Technical Memorandum in Dec. 1983 (2)
- Presented a paper on Risk Management at the NASA Academy of Program and Project Leadership (APPL) Forum of Master Project Managers Feb. 2005 (3)
- Implementing a formal Risk Management Process on a NASA Project/Program was described at last years (2008) Project Management Challenge in the presentation: Risk Management Getting Started (4)

Introduction

- How Project Managers identify and deal with risk is often the key to success or the reason for failure
- A complex multi-agency, multi-contractor, flight research will be reviewed
- Simple but effective methods of identifying and successfully meet all cost, schedule and technical objectives will be discussed
- Emphases is on how these techniques can be used to improve project success but examples of how probabilistic and risk management techniques can be used to improve personal success will be highlighted

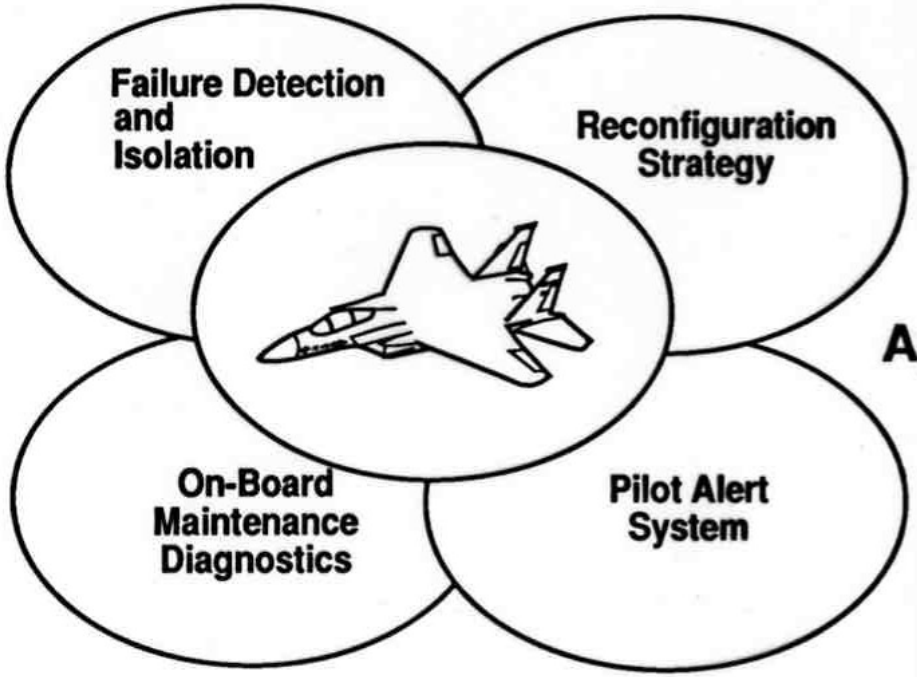
The Self-Repairing Flight Control (SRFC) Project

The Self-Repairing Flight Control (SRFC) Project was a technical success[5]. *Even more of a success was the project management of the SRFC project: meeting cost, schedule, and technical objectives.*



Self-Repairing Flight Control System

F15V89-205



Objective:

- Demonstrate a SRFCS proof-of-concept sufficiently to transition technology for the next generation of aircraft.

Approach:

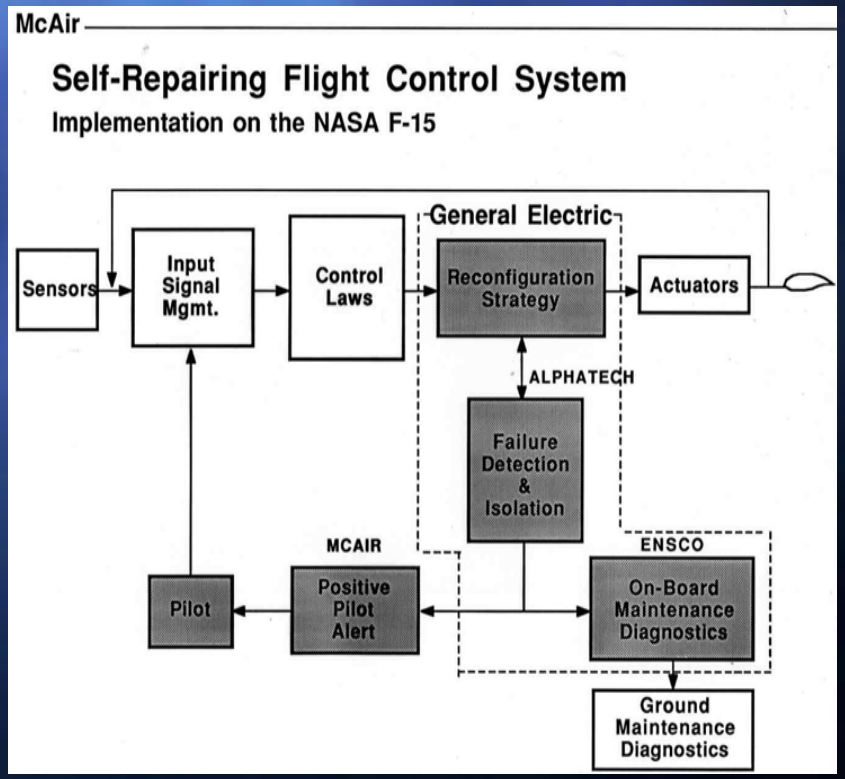
- Develop, implement and flight test a SRFCS including real-time reconfiguration, fault detection and isolation, positive pilot alert system and maintenance diagnostics on NASA's Highly Integrated Digital Electronic Control Flight Research Facility.

SRFCS Project Highlights

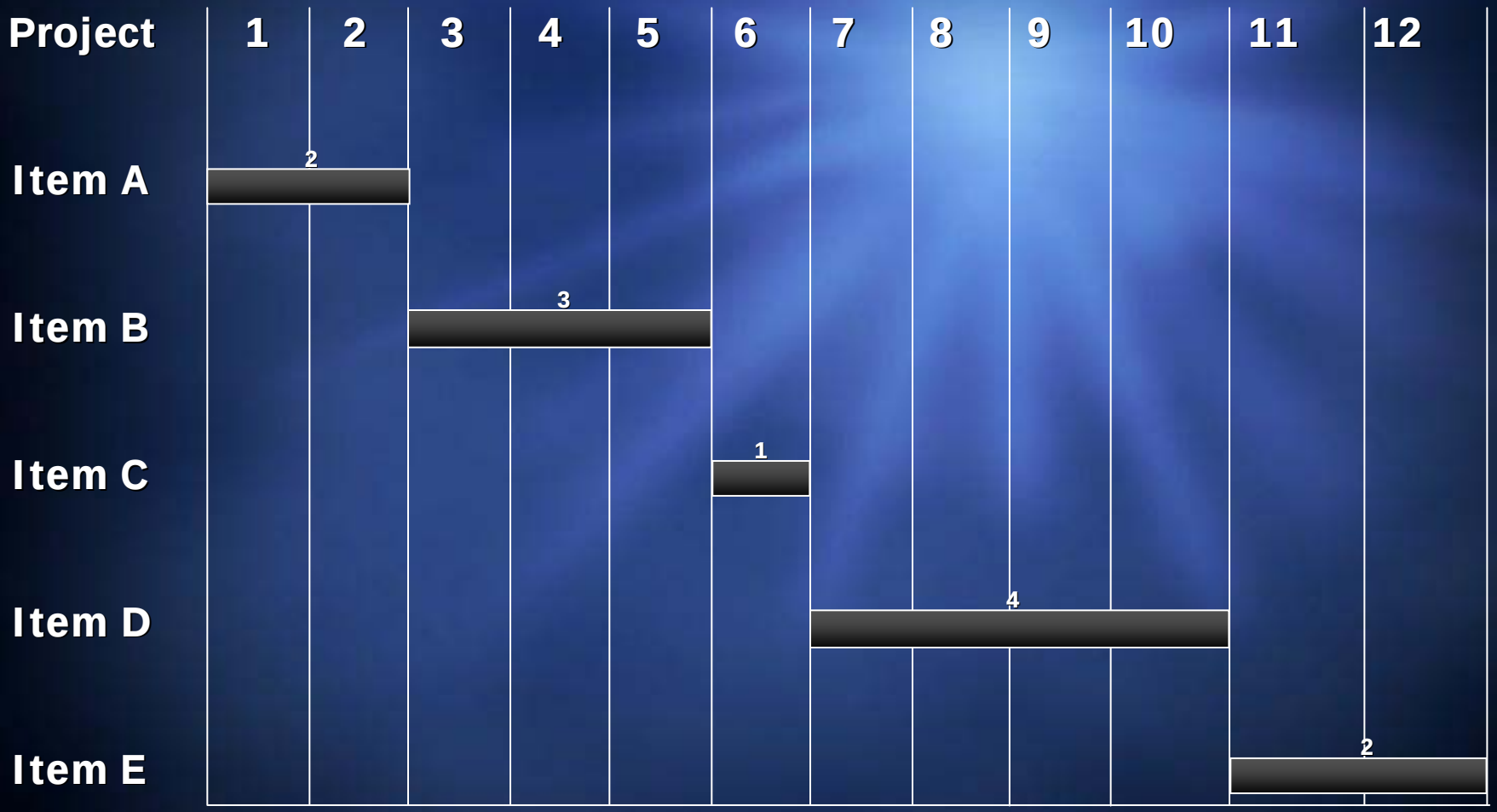
- Air Force Requirements
  - Fixed Budget
  - Firm Flight Date
  - Specific Flight Objectives

- NASA Responsibilities
  - Develop Agreement with Air Force
  - Develop contact with McAir and subcontracts
  - Modify F-15 HIDEC Aircraft
  - Manage the project, contracts and technical government lead

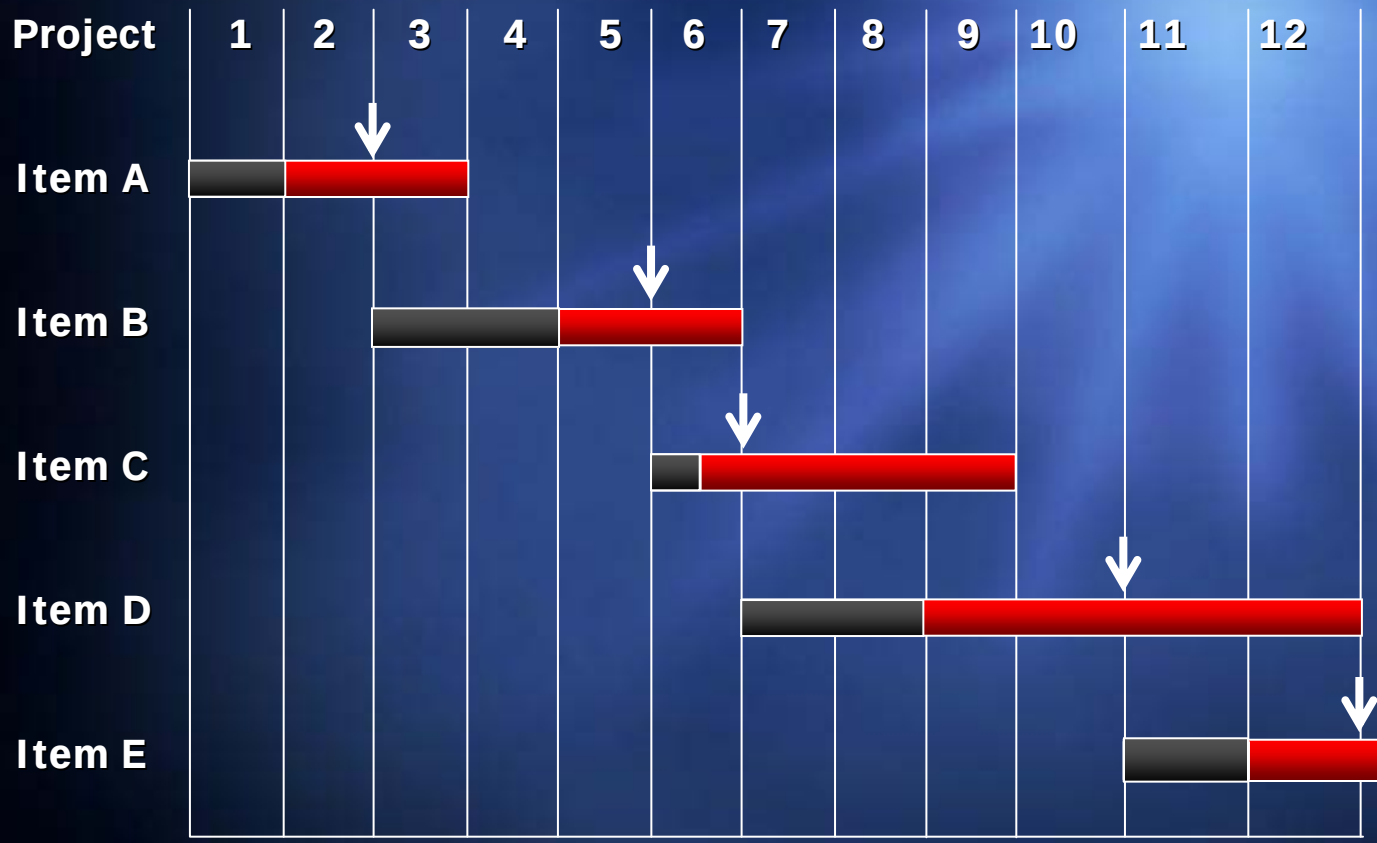
- Development Needed
  - GE: Reconfiguration Strategy
  - ALPHATECH: Failure Detection and Isolation
  - ENSCO: On-board Maintenance Diagnostics
  - McAir: Position Pilot Alert
  - McAir: Integration of System
  - NASA: Development and implementation of aircraft modifications
  - NASA: Aircraft Checkout with SRFC System
  - NASA: Flight Test



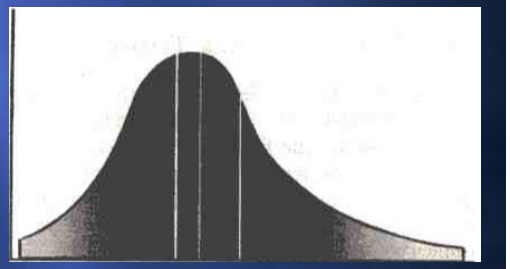
Sample Schedule



Sample Schedule with Risk Identified



	Expected Value	Min	Max
	2	1	3
	3	2	4
	1	.5	4
	4	2	6
	2	1	3
	12	6.5	20



Uncertainty

The Project Managers Needs to Develop the Schedule with the Team (Persons Doing the Task)

- Make sure the team thinks of the schedule as probabilistic

  - Set Schedule Lengths
    - » Expected
    - » Minimum
    - » Maximum

    - » Identify expected schedule
    - » Identify what it takes to make minimum schedule
    - » Identify what could occur to cause the maximum schedule

  If these conditions occur, what are the options?
  If these conditions occur, how do we minimize the effect?

Examples of Risk Management for the SRFC Project

- Search for and locate risks before they become problems
  - Phase O flight test flown in March 1989 to test different implementation methods of the expert maintenance diagnostics
- Convert risk into useable information for determining priorities and making decisions
  - Early installation and checkout of the Rolm Hawk computer that was used for most of the SRFC software
  - Early aircraft modification replacing the mechanical actuators with electric serves
- Translate risk into planning decisions and mitigation action plans
  - When the only Rolm Hawk computer at Dryden broke we had a plan in place to get a spare, that was at McAir, shipped overnight and received it before start of business the next day
  - When technical problems occurred on flight critical software at General Electric we had a plan in place to insure successful software development

Accomplishments

- SRFC Project met technical objectives and accomplished the objectives on schedule and cost

- Air Force needed to fly by end of calendar year 89
    - Flight 1 was on 12/12/89
    - Had 4 flights by end of year
    - Completed 25 flights and 42.9 flight hours
        - » Performed more flights than required
        - » Performed more flight hours than required

- Had to be completed by end of April, not to impact the next Project Performance Seeking Controls (PSC) schedule
    - Completed last flight 04/03/90

- As for the Budget
    - Finished the project $4,000 under budget

Summary

- Schedule may appear deterministic but there always probabilistic
- Adjust for risk if you can
- Use the risk identification process to your advantages in managing the project
- As part of risk identification (make sure person's doing the work are involved)
    - Identify ways to reduce risk
    - Identify options

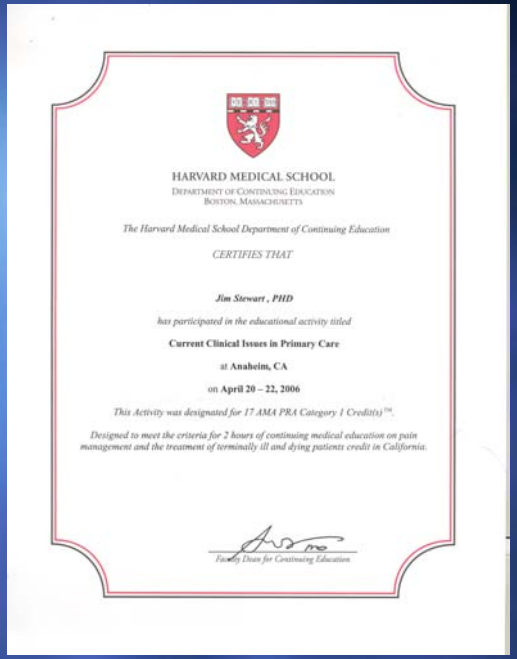
Things to think about

- Make sure everyone knows why the project is being done
- Develop open communication with your team
- Include risks in communications as a topic at team meetings
- Use your team members expertise to make your estimates more reliable and to obtain buy-in
- Make sure your team thinks of the schedule as probabilistic at least in terms of expected, with minimum and maximum
- Have the team identify what could occur to cause the maximum schedule
  - if these conditions occur, what are the options
  - If these conditions occur, how do we minimize the effects
- Include team members in creating the schedule and in approval of the final schedule
- It takes less effort to prevent problems than to deal with them

How Risk Management Can Make You Healthy, Wealthy and Wise

Risk Management Can make You Healthy

- I have attended 3 or 4 medical conferences per year for more than 15 years
- Every conference talks about the risks and how to manage the risks
- Detailed studies have identified and quantified the risks for most major health problems



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CERTIFIES THAT

Jim Stewart , PHD

has participated in the educational activity titled

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This Activity was designated for 17 AMA PRA Category 1 Credit(s)™.

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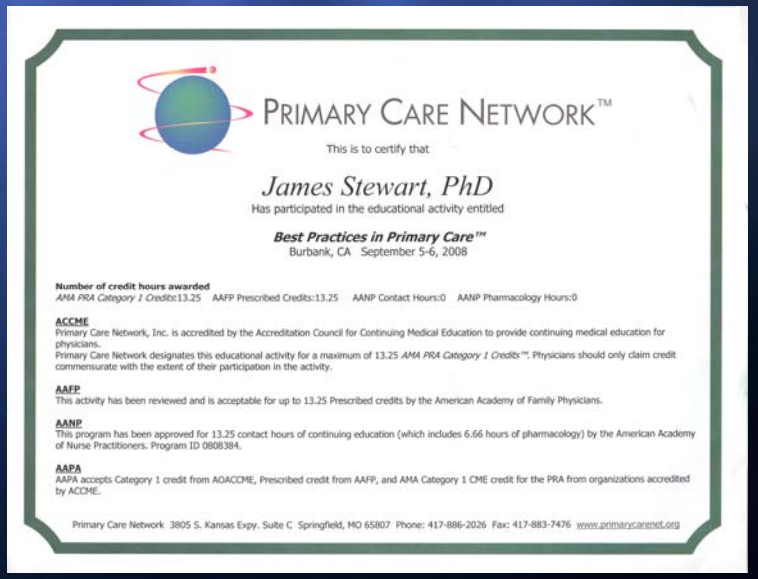

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This is to certify that

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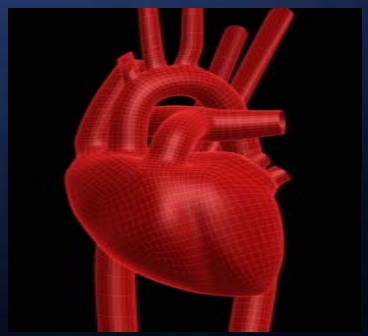
Risk Management Can Make You Healthy

- Risk factors have been identified for cancers, strokes, heart attacks, and other serious illness.
- By reducing the risk factors you can be healthier and live longer.
- You could identify each risk and reduce each risk. One approach has been offered by Dr. Michael Roizen M.D. in his book "The Real Age Makeover".
- You can not change your calendar age but you can change how much your body has aged and how to reduce aging and even reverse your aging based on risk factors and choices you've made for yourself.
- You can identify risk factors and how to reduce your risks, improve your health and increase your chances of living longer.



Risk Management Can Make You Wealthy

Statistical measurements used in Modern Portfolio Theory (MPT) to help investors determine the risk-reward profile. (definitions from Investopedia financial dictionary)

- Alpha: a measure of performance on a risk-adjusted basis
- Beta: a measure of volatility, or systematic risk, of a security or a portfolio in comparison to the market as a whole.
- Sharpe Ratio: a ratio developed by Nobel Laureate William F. Sharpe to measure risk-adjusted performance. The ratio tells us whether a portfolio's returns are due to smart investment decisions or a result of excess risk.
- Monte Carlo Simulation: a problem solving technique used to approximate the probability of certain outcome by running multiple trail runs.

Risk Management Can Make You Wiser

1. Stop thinking of the world as deterministic it is probabilistic

2. Use the risk identification process to your advantage in managing your health, your wealth and your projects

3. After today you should look at the risk you take and determined how to manage those risk to make wiser decisions

References

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3. Stochastic Processes and Exogenous Variables or How to Improve Project Performance by James F. Stewart NASA APPL Forum of Master Project Managers, Feb. 2008

4. Risk Management Getting Started by Cynthia Calhoun, NASA Project Management Challenge 2009

5. Self-Repairing Flight Control, NASA Dryden Historical Study No. 1 by James E. Tomsyko Edited by Christian Gelzer, published by NASA Dryden Flight Research Center, Oct. 2003